

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2017/2018

PAM0135 –ALGEBRA

(Foundation in Information Technology / Life Sciences)

4 June 2018
2.30 p.m - 4.30 p.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.
2. Answer **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.
4. All necessary working steps **MUST** be shown.

Instruction: Answer ALL questions.

Question 1 [10 marks]

Solve the equations:

- a. Solve the equation: $\sqrt{2-x} = \sqrt{2-2x} + 1$ (5 marks)
- b. Solve the following inequality: $\frac{3x}{x+6} \leq 5$ (5 marks)

Question 2 [10 marks]

- a. Determine the domain of the functions $f(x) = 5x^4 + x^3 - 5$ and $g(x) = \frac{\sqrt{2x+4}}{x-5}$. (2 marks)
- b. Solve the following equations:
- i. $4^x - 7(2^x) + 12 = 0$ (4 marks)
- ii. $\log_3(x-5) - \log_3(3x+2) = 2$ (4 marks)

Question 3 [10 marks]

- a. For the polynomial $f(x) = x^3 - x^2 - 12x$
- i. Find the x and y intercept of the graph of f . (2 marks)
- ii. Determine whether the graph crosses or touches the x -axis at each x -intercept. (1 mark)
- iii. End behavior: find the power function that the graph of f resembles for large values of $|x|$ (1 mark)
- iv. Determine the maximum number of turning points on the graph of f . (1 mark)
- v. Put all the information together to obtain the graph of f . (3 marks)
- b. Sketch the graph of the function $f(x) = e^x - 1$. Show clearly at least 2 points on the graph and the horizontal asymptote. (2 marks)

Continued...

Question 4 [10 marks]

- a. Use the Principle of Mathematical Induction to show that:

$$4 + 9 + 14 + 19 + \dots + (5n - 1) = \frac{n}{2}(3 + 5n). \quad (5 \text{ marks})$$

- b. In the expansion of $\left(2x + \frac{1}{3}\right)^{12}$, find:

i. the coefficient of x^7 . (2 marks)

ii. the last three terms of the expansion. (3 marks)

Question 5 [10 marks]

- a. Find the sum of the geometric series $-2, \frac{1}{2}, -\frac{1}{8}, \dots, -\frac{1}{37268}$. (5 marks)

- b. The fifth term and the tenth term of an arithmetic sequence are 22 and 112 respectively.

i. Find the first term and the common difference of the sequence. (3 marks)

ii. Find the twentieth term of the sequence. (1 mark)

iii. Find the sum of the first 10 terms of the sequence. (1 mark)

End of Page

APPENDIX

$$a^2 - b^2 = (a - b)(a + b)$$

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

$$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$

$$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$\log_b b = 1$$

$$\log_b (MN) = \log_b M + \log_b N$$

$$\log_b M^p = p \log_b M$$

$$\log_b 1 = 0$$

$$\log_b \left(\frac{M}{N} \right) = \log_b M - \log_b N$$

$$\log_b M = \frac{\log_a M}{\log_a b}$$

$$a_n = a_1 + (n - 1)d$$

$$S_n = \frac{n}{2}(2a_1 + (n - 1)d) = \frac{n}{2}(a_1 + a_n)$$

$$a_n = a_1 r^{n-1}$$

$$S_n = \frac{a_1(1 - r^n)}{1 - r}$$

$$S = \frac{a_1}{1 - r}, \text{ infinite sum } |r| < 1$$